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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/763,857	05/31/2001	Ralf Trutschel	10191/1750	3474

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KENYON & KENYON
ONE BROADWAY
NEW YORK, NY 10004

EXAMINER

KIM, CHRISTOPHER S

ART UNIT	PAPER NUMBER
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3752

DATE MAILED: 06/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/763,857	Applicant(s) TRUTSCHEL ET AL.	
	Examiner Christopher S. Kim	Art Unit 3752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2004.
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-34 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 23-34 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Amendment filed March 27, 2004 is acknowledged.
2. This Office action utilizes line numbers, which includes numbering of blank lines, provided by the applicant when referring to lines in the specification section of the application by line number.
3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Drawings

4. The drawings were received on March 27, 2004. These drawings are unacceptable. Replacement sheet 3 shows an entry plane 110 that is larger than the projection of the flattened face. This shown would constitute new matter.
5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "fuel injection system of an internal combustion engine" recited in claims 23 and 34; the "direct injection of a fuel into a combustion chamber of the internal combustion engine" recited in claim 24; the "entry plane" recited in claims 23 and 34; the "projection" recited in claims 23 and 34 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

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A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

6. Claim 24 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 24 merely recites the intended use of the fuel injector.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 31 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure, as originally filed, fails to disclose "the plurality of swirl channels is not connected to an outer periphery of the disk-shaped

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swirl element by a peripheral edge area." The disclosure, as originally filed, does not teach such a exclusionary, negative limitation.

9. Claims 30 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 30 recites the limitation "the valve seat element includes a spray element which includes the outlet orifice and is arranged downstream from the valve seat element, wherein: the spray element is part of the valve seat element." Is the "spray element" or the "outlet orifice" downstream from the valve seat? In either case, how can the "outlet orifice" which makes up the "spray element" which in turn makes up the "valve seat element" be downstream from itself (the "valve seat element")?

Claim 34 recites the limitation "the entry plane" in line 19. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

10. Claims 23-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al. (4,890,794) in view of Shen et al. (5,878,962).

With respect to claims 23, 24, 25, 27-30 and 32-34, Imafuku et al. discloses a fuel injector comprising: an energizable actuating element 14; a valve needle 27; a fixed valve seat 48; a valve seat element 9, 55; an orifice 54a,b; a valve closing section 47; a flattened face (downstream end of 45); an outlet orifice (outlet of orifice 54a,b). The entry plane of the outlet orifice (outlet of orifice 54a,b) is arranged such that the entry

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plane is completely covered by a projection of the flattened face (downstream end of 45) into the entry plane (projection of downstream end of 45 onto orifice 45 at an angle such that the projection completely covers the orifice). Imafuku et al. does not disclose a swirl-producing element. Shen et al. discloses a swirl-producing element 38, 48 upstream of a fixed valve seat 34. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have incorporated the swirl-producing element of Shen et al. to the device of Imafuku et al. to provide a swirl pattern spray.

With respect to claim 26, Imafuku et al. in view of Shen et al. discloses the limitations of the claimed invention with the exception of the ratio. It would have been obvious to one having ordinary skill in the art at the time the invention was made to d/D of approximately 1.5 for optimization dependent of operating criteria, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

11. Claims 23-30 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ren et al. (5,996,912).

Ren et al. differs from what is being claimed in the flattened face diameter d being greater than the outlet orifice diameter. Ren et al. discloses an outlet orifice diameter d_0 which is greater than the flattened face diameter d_f . This embodiment is precisely the embodiment applicant discloses in figure 6 and on page 9, lines 8-13 of the current application. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have optimized the values of d_0 and

d_f for desirability dependent on certain applications (applicant's specification, page 9, line 12).

Response to Arguments

12. Applicant's arguments filed November 14, 2003 have been fully considered but they are not persuasive.

Applicant argues that the prior art does not disclose the flattened face completely covering the entry plane when the projection is directed in a direction perpendicular to the flattened face. The examiner presumed the "entry plane" of the outlet orifice to define the plane at the entrance of the outlet orifice 32. If so interpreted, applicant's argument would be convincing. But, applicant proposed to show a corrected figure 3 which shows an entry plane 110 which is upstream of the outlet orifice 32 and having a larger diameter than the flattened face. Examiner now takes the position that the "entry plane" is not restricted to the "outlet orifice", i.e., the entry plane can be upstream of the outlet orifice, and the entry plane can be completely covered by a magnified projection of the flattened face in a direction perpendicular to the flattened face. In other words, the "entry plane" is considered to be any plane, in the prior art, which is upstream of the outlet orifice that would be completely covered by the projection of the flattened face in a direction perpendicular to the flattened face.

In response to applicant's argument that Shen cannot be combined with Imafuku because Shen requires a smooth transition, see Shen, column 4, lines 35-40. Shen

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discloses "it is believed that the large angle does not deleteriously affect the swirl pattern".

In response to applicant's arguments directed to the examiner's comment of inherency, Ren discloses the diameters of the outlet orifice and the flattened face and their relationship. Ren discloses, in column 3, lines 55-60, that in a "majority of the embodiments," the diameter d_f is less than diameter d_o . Therefore, in a minority of the embodiments, the diameter d_f must be greater than or equal to diameter d_o . Ren also states that it "is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims." There rejection is on the basis that it is within one of ordinary skill in the art to discover optimum values of disclosed parameters. And in a case where diameter d_f is greater than diameter d_o , the projection of the flattened face would inherently, completely cover the outlet orifice.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the


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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher S. Kim whose telephone number is (703) 308-8336. The examiner can normally be reached on Monday - Thursday, 6:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Y. Mar can be reached on (703) 308-2087. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Christopher S. Kim
Primary Examiner
Art Unit 3752

CK